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April 25, 2018

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: ***Written Ex Parte Communication***

GN Docket No. 17-258, *Promoting Investment in the 3550-3700 MHz Band.*

Dear Ms. Dortch:

The Commission has an important opportunity to support the introduction of Fifth Generation ("5G") wireless services in mid-band spectrum by modifying its rules governing the 3550-3700 MHz band (the "3.5 GHz band"). As the Notice of Proposed Rulemaking in this proceeding recognizes, the current rules are not optimized for the provision of 5G services.[1/]

One of the ways that the rules can be improved is to change the area by which Priority Access Licenses ("PALs") are issued. In its comments in this proceeding, T-Mobile USA, Inc. ("T-Mobile")[2/] urged the Commission to issue PALs based on Partial Economic Areas ("PEAs").[3/] As outlined further below, one of the bases for T-Mobile's recommendation is the technical limitations of using the 3.5 GHz band when a licensee or spectrum access system ("SAS") administrator is required to take into account the operations of geographically nearby co-channel users – a problem made worse in urban areas where the existing rules would permit numerous census tract-based licensees.

1/ *See Promoting Investment in the 3550-3700 MHz Band; Petitions for Rulemaking Regarding the Citizens Broadband Radio Service*, Notice of Proposed Rulemaking and Order Terminating Petitions, 32 FCC Rcd 8071 (2017) ("NPRM"); NPRM ¶ 2 ("To maintain U.S. leadership in the global race for 5G, we must ensure that the service rules governing bands that are critical for 5G network deployments—including the 3.5 GHz Band—keep up with technological advancements, create incentives for investment, encourage efficient spectrum use, support a variety of different use cases, and promote robust network deployments in both urban and rural communities."); NPRM ¶ 3 ("We anticipate that the targeted changes considered in this Notice will foster an investment environment for the band to flourish in the United States, as other nations target these frequencies for 5G and next-generation technologies.").

2/ T-Mobile USA, Inc. is a wholly owned subsidiary of T-Mobile US, Inc., a publicly traded company.

3/ Comments of T-Mobile USA, Inc., GN Docket No. 17-258, at 9 (filed Dec. 28, 2017).

Outside of urban areas, those problems may be easier to address. Moreover, T-Mobile appreciates that some participants in this proceeding perceive that an auction of larger license areas will make it difficult for them to secure PALs. That is why T-Mobile agrees with CTIA's and CCA's proposal that the Commission issue PALs based on Metropolitan Statistical Areas ("MSAs") in the top 306 Cellular Market Areas ("CMAs") and based on counties in the remainder of the country.[4/] This approach will allow the Commission to avoid the engineering challenges of using 3.5 GHz spectrum in too-small geographic areas in urban locations while potentially fostering the use of the spectrum by smaller providers in rural areas.

The Use of Census Tracts in Urban Areas Presents Potentially Insurmountable Technical Issues

Avoiding the use of too-small geographic area licenses in urban areas is unrelated to providing access to PALs for smaller entities. It is solely based on the technical inability to use the 3.5 GHz band where there are too many geographic area boundaries close to each other. Licensing PALs by census tracts in urban areas will not expand the pool of providers meaningfully able to participate in an auction – it means that any auction winner in an urban area will secure an authorization that will be significantly impaired and may be unable to be practically used. That result is contrary to the interest of auction winners and contrary to the public interest.

The rules require that the SAS refrain from authorizing other PAL or General Authorized Access ("GAA") Citizen Band Subscriber Devices ("CBSDs") on the same channel in geographic areas and at maximum power levels that will cause aggregate interference in excess of -80 dBm/10 megahertz within the licensee's PAL Protection Area ("PPA").[5/] The more a licensed geographic area is reduced, the more these protection requirements limit licensees' ability to fully utilize their assigned spectrum throughout their geographic service areas. This is because with small license areas, there is a much higher likelihood that when a licensee seeks to deploy a CBSD, there will be a nearby PPA that requires protection, forcing the licensee to reduce power, move its CBSD away from the co-channel PPA, use antenna tilt, limit transmission in one or more directions, or take other steps to protect the transmitter deployed in the adjacent geographic area.

4/ Letter from Rebecca Murphy Thompson, Executive Vice President and General Counsel, Competitive Carriers Association, and Scott K. Bergmann, Senior Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-258, at 1 (filed Apr. 20, 2018).

5/ The PPA is the PAL licensee's protection contour, as reported by the licensee or calculated by the SAS. *See* 47 C.F.R. § 96.3. The Wireless Internet Service Providers Association ("WISPA") asserts that because the interference test is not based on license-area boundaries, the limited size of a license area is not material. Letter from Stephen E. Coran, Counsel, WISPA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-258 (filed Apr. 23, 2018) ("WISPA Letter"). WISPA misses the point. Regardless of whether a license area boundary or PPA requires protection, the proximity of many other users would require self-limiting actions that would make the spectrum valueless in urban areas. WISPA states that "unless the licensee of an adjacent PAL area, which itself may include many contiguous PALs, has a PPA right up to its boundary, then the -80 dBm level only applies with the PPAs themselves, not to the PAL boundary." *Id.* at 4. But in urban areas, that is exactly what will occur. With census tracts only the size of several city blocks or smaller, PPAs will routinely be coterminous with license boundaries, limiting the utility of the licensed spectrum.

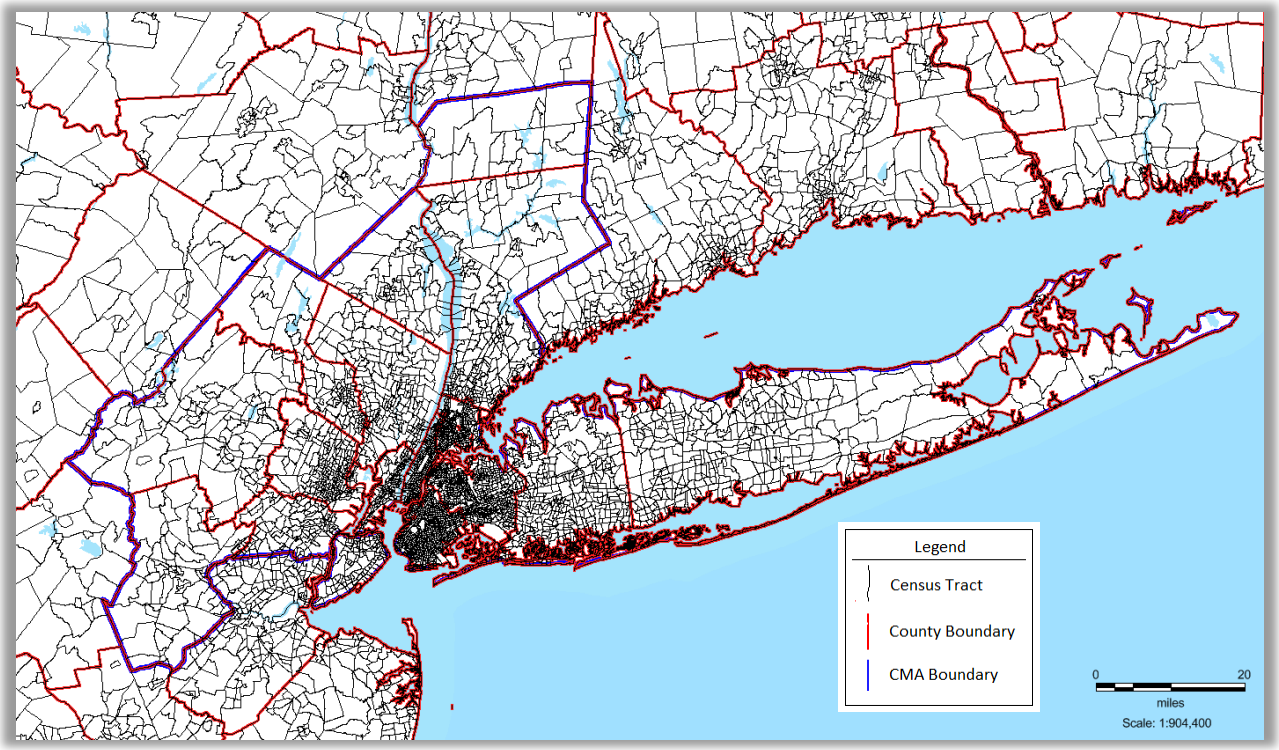
Moreover, the technology currently expected to be deployed in the band is Time Division Duplex-Long Term Evolution ("TDD-LTE"). Because there are not separate uplink and downlink bands, interference can occur when uplink transmissions overlap with downlink transmissions. TDD-LTE therefore requires coordination among co-channel and adjacent channel systems at geographic area borders to manage and contain interference, making synchronization of the adjacent TDD-LTE networks necessary to prevent cross-cell interference.[6/] With small license areas, that synchronization of uplink and downlink operations with adjacent licensees would be almost impossible to implement.

The map below shows the New York CMA and the component census tracts and counties. By way of overview, the CMA contains the following counties and census tracts within each county.

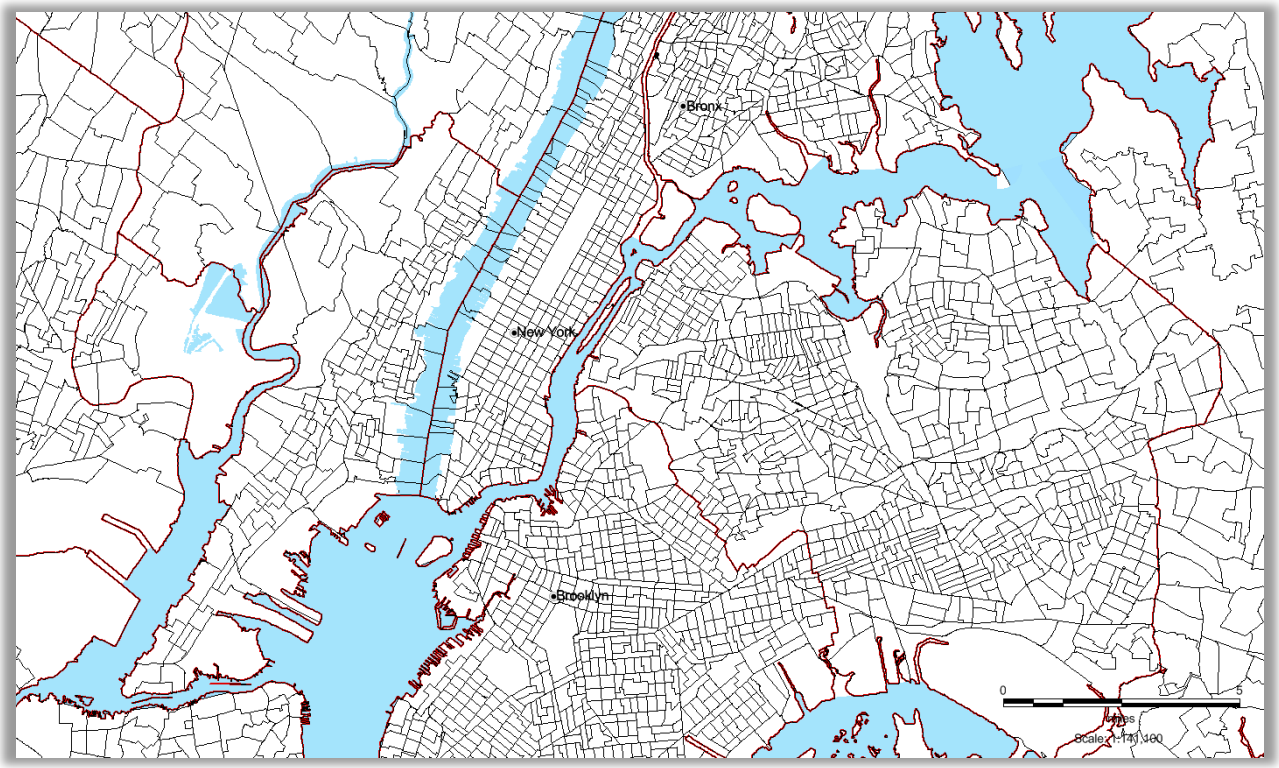
County	**State**	**Number of Census Tracts in County**
Bergen	NJ	179
Essex	NJ	210
Hudson	NJ	166
Morris	NJ	100
Passaic	NJ	100
Somerset	NJ	68
Union	NJ	108
Bronx	NY	339
Kings	NY	760
Nassau	NY	279
New York	NY	288
Putnam	NY	19
Queens	NY	668
Richmond	NY	109
Rockland	NY	65
Suffolk	NY	322
Westchester	NY	223

Total Census Tracts in New York CMA: 4,003

6/ ITU, COEXISTENCE OF TWO TIME DIVISION DUPLEX NETWORKS IN THE 2300-2400 MHZ BAND, Report ITU-R M.2374-0 at 15 (2015) ("*For achieving synchronization, when two TDD networks are operating in same geographic area, according to ECC-Report 216 on practical guidance on TDD network synchronization, all base stations that may interfere with each other (both within one operators network and between operators in the same frequency band) need to implement* a common reference phase clock and configure compatible frame structures. GNSS, IEEE 1588 v2, and over the air synchronization techniques are currently available for transmitting a reference phase/time clock. In order to deploy synchronised TDD networks in a multi-operator context (without guard bands), agreement needs to be reached on: A common phase clock reference and accuracy/performance constraints." (internal citations omitted)).



And the following map shows the census tract boundaries in the most densely populated sections of the New York CMA.



Plainly, the use of census tracts in large urban areas like New York is untenable. The use of a particular spectrum block in one census tract will prevent its use in adjacent census tracts in any meaningful way in order to meet the interference requirement.[7/] Moreover, using census tracts in urban areas will also impede the ability of the SAS to assign channels. With smaller license areas, the SAS would be unable to effectively implement channel reuse to manage interference. The result will be particularly severe for GAA users because under current rules, the SAS assigns channels dynamically and therefore would be required to assign channels that might otherwise be available for GAA operations to accommodate PAL access. The use of counties is not much better. The 17 counties in the New York CMA are considered a single economic market – that is the precise reason they comprise a CMA. Yet, issuing licenses on a county basis in New York would potentially produce 119 separate PAL holders in that area, which would require the SAS to arbitrate the use of spectrum among those 119 PAL holders.

WISPA dismisses these concerns by asserting that a SAS is required to assign geographically contiguous PALs held by the same PAL holder the same channel block in each geographic area.[8/] But in order for WISPA's premise to be true – a limited impact on PAL holders – the PAL holder would be required to secure geographically contiguous PALs. There are over 4,000 census tracts in the New York CMA – some as small as a single building. That means there would be a potential for over 28,000 census tract-based licenses in New York alone. That would mean that a provider seeking to offer service throughout the CMA – and, more importantly, take advantage of the rule that WISPA cites – would be required to bid on 28,000 licenses and be the auction winner 4,000 times *in a single geographic area.* Even with a committed bidder, the odds against success are staggering. So, instead of taking advantage of the contiguous-area rule, an auction winner with a checkerboard of census tract-based licenses would be able to use none of them.[9/]

A Mix of Census Tract-Based and Other Geographic Area Licenses Does Not Solve the Technical Limitation in Urban Areas

The IIoT Coalition has proposed that there should be at least three census-tract PALs in *all* areas of the United States.[10/] But it fails to address the unavoidable limitations on the use of spectrum

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7/ WISPA asserts that this result is not problematic because T-Mobile is likely to deploy within PAL service areas of a "few hundred meters." *Id.* at 2. That assumption is incorrect. As T-Mobile noted in its reply comments in this proceeding, the 3.5 GHz will not be used for only small cell applications. Reply Comments of T-Mobile USA, Inc., GN Docket No. 17-258, at 20 (filed Jan. 29, 2018) ("The notion that the 3.5 GHz band will feature only small cells assumes that outdoor CBSDs will be installed at low heights and therefore would have a very small coverage area.").

8/ WISPA Letter at 2.

9/ And WISPA's suggestion that PAL holders enter into what are commonly referenced as extension agreements is not productive. The sheer number of census tract-based licenses in an urban area like New York will make it infeasible to enter into those agreements. WISPA is correct that T-Mobile is familiar with these commercial agreements. *Id.* at 3. But never in the scope that would be required for use of census tract-based licensing in urban areas.

10/ Letter from the IIoT Coalition to Marlene H. Dortch, Secretary, FCC, GN Docket 17-258, at 3 (filed Apr. 18, 2018).

demonstrated above. While, as the IIoT Coalition asserts, industrial and critical infrastructure entities operate facilities in diverse urban, suburban, rural, and remote locations, its members' needs for access to spectrum will be frustrated by the adoption of census tract licensing in urban areas. The IIoT Coalition argues that it would not be rational for an industrial user to participate in an auction for PEA-sized licenses in urban areas – the bidder would overpay for the PEA just to serve the more limited area it wished to cover.[11/] But it would be less rational still for a bidder to secure a license it could not use because of the need to limit spectrum use so dramatically so as to make the license valueless.

T-Mobile appreciates that some users wish to employ spectrum in a micro-geographic environment. But that business plan cannot supersede sound spectrum management and engineering practices. Instead, the Commission must encourage those potential spectrum users to engage in secondary market transactions with PAL holders through more flexible spectrum leasing policies and other mechanisms.

Nor is it an acceptable result for the Commission to issue some census tract-based licenses in urban areas – recognizing that they will be unusable – with the understanding that at least some PALs will be issued on a non-census tract-basis. The maps above demonstrate the point. If some PALs are issued in New York on an MSA or county basis, the license holder would still be required to account for *hundreds* of census tract licensees. There are 760 census tracts in Brooklyn and 668 in Queens. Hundreds of those licenses would share a geographic border with a county-based license on other channel blocks. Even if the non-census tract licenses were issued on an MSA basis, they would share a common border with dozens of census tract-based licenses – meaning the technical impracticality would remain. The problem is further compounded given that coordination is required with both co-channel and adjacent channel licensees.

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11/ Letter from the IIoT Coalition to Marlene H. Dortch, Secretary, FCC, GN Docket 17-258, at 2-3 (filed Apr. 19, 2018).

Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed in the above-referenced docket. Please direct any questions regarding this filing to mm.

Respectfully submitted,

/s/ Steve B. Sharkey

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